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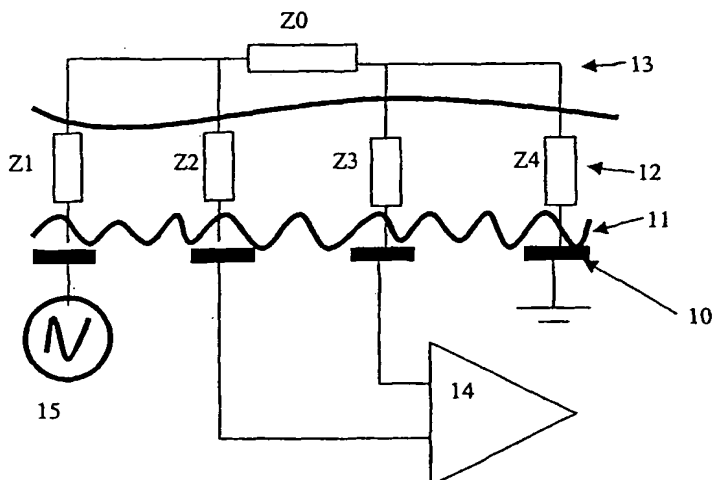
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[Continued on next page]

(54) Title: LIVE FINGER DETECTION BY FOUR-POINT MEASUREMENT OF COMPLEX IMPEDANCE



(57) Abstract: Method and sensor assembly determining the condition of a structure, especially for confirming if a measured fingerprint is on a live finger, by measuring characteristics of close to the structure surface, the sensor comprising a first pair of current supply electrodes coupled to a current source, providing an electrical current to the skin, at least two pickup electrodes at chosen and different positions relative to the current supply electrodes, at least a first of said pickup electrodes being coupled to an instrument for measuring the voltage between said first pickup electrode and at least one of the pickup or current supply electrodes, storage means for a predetermined set of values characterizing a certain condition of the surface, and means for comparing the characteristics from each pickup

electrode with the measurements of the other pickup electrodes and with the predetermined set of characteristics for determining the surface condition.

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# INTERNATIONAL SEARCH REPORT

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## A. CLASSIFICATION OF SUBJECT MATTER

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## B. FIELDS SEARCHED

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|-----------|---|-----------------------|
| P,X       | WO 03094724 A1 (IDEX ASA), 20 November 2003<br>(20.11.2003), see the whole document   | 1-10                  |
| X         | WO 0019894 A1 (POLARTECHNICS LIMITED),<br>13 April 2000 (13.04.2000), page 5,<br>line 25 - line 35; page 6, line 20 - page 7,<br>line 11; page 8, line 31 - page 10, line 9,<br>figures 1b,4,5, abstract, page 14 - page 15 | 1-5,8,9               |
| Y         |   | 6,7,10                |

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☒ See patent family annex.

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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No. |
|-----------|--|-----------------------|
| X         | WO 9923945 A1 (FIELDS), 20 May 1999 (20.05.1999),<br>page 2, line 25 - page 6, line 12; page 8,<br>line 25 - page 10, line 10, figure 2  | 1-5,8,9               |
| Y         | --   | 6,7,10                |
| A         | US 2001005424 A (MARKSTEINER), 28 June 2001<br>(28.06.2001), see summary of the invention  | 1-5,8,9               |
| Y         | --   | 6,7,10                |
| A         | US 5953441 A (SETLAK), 14 Sept 1999 (14.09.1999),<br>column 8, line 5 - line 35; column 9,<br>line 51 - column 10, line 47, figures 1-13   | 1-5,8,9               |
| Y         | --   | 6,7,10                |
| A         | WO 0156468 A2 (MASSACHUSETTS INSTITUTE OF<br>TECHNOLOGY), 9 August 2001 (09.08.2001), page 13,<br>line 24 - page 14, line 6; page 15,<br>line 9 - line 14; page 18, line 1 - line 26,<br>figures 2a,2b,3 | 1-5,8,9               |
| A         | EP 0315854 A1 (KAO CORPORATION), 17 May 1989<br>(17.05.1989), page 4, line 7 - line 29, figures 1,<br>2, abstract  | 1-5,8,9               |
|           | --<br>-----  |                       |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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|    |            |    |            |      |              |            |
|----|------------|----|------------|------|--------------|------------|
| WO | 03094724   | A1 | 20/11/2003 | NO   | 20022310 D   | 00/00/0000 |
| WO | 0019894    | A1 | 13/04/2000 | AU   | 6512399 A    | 26/04/2000 |
|    |            |    |            | EP   | 1119288 A    | 01/08/2001 |
|    |            |    |            | US   | 6032157 A    | 29/02/2000 |
| WO | 9923945    | A1 | 20/05/1999 | AU   | 1013399 A    | 31/05/1999 |
|    |            |    |            | AU   | PP031097 D   | 00/00/0000 |
| US | 2001005424 | A  | 28/06/2001 | BR   | 9911940 A    | 27/03/2001 |
|    |            |    |            | CN   | 1308506 T    | 15/08/2001 |
|    |            |    |            | DE   | 19830830 A,C | 20/01/2000 |
|    |            |    |            | EP   | 1094750 A    | 02/05/2001 |
|    |            |    |            | JP   | 2002520079 T | 09/07/2002 |
|    |            |    |            | US   | 6597945 B    | 22/07/2003 |
|    |            |    |            | WO   | 0002485 A    | 20/01/2000 |
| US | 5953441    | A  | 14/09/1999 | NONE |              |            |
| WO | 0156468    | A2 | 09/08/2001 | US   | 2002045838 A | 18/04/2002 |
|    |            |    |            | US   | 2003149376 A | 07/08/2003 |
| EP | 0315854    | A1 | 17/05/1989 | DE   | 3884136 D,T  | 21/04/1994 |
|    |            |    |            | ES   | 2045061 T    | 16/01/1994 |
|    |            |    |            | JP   | 1126535 A    | 18/05/1989 |
|    |            |    |            | JP   | 1756184 C    | 23/04/1993 |
|    |            |    |            | JP   | 4045778 B    | 27/07/1992 |
|    |            |    |            | US   | 4966158 A    | 30/10/1990 |